WHAT IS CLAIMED IS:

1. A drive system for varying the transmission ratio between a first motor and an output shaft, comprising:

a first motor;

a second motor;

an output shaft;

a control system coupled to the first and second motors, the control system controlling operation of the first and second motors; and

a planetary gear set including a ring gear, a sun gear and a carrier which supports at least one planet gear, the first motor, the second motor, and the output shaft each being coupled to at least one of the ring gear, sun gear and carrier, wherein the transmission ratio between the first motor and the output shaft is varied by varying the speed of the second motor.

2. The drive system of claim 1, wherein:

the output shaft speed increases when the speed of the second motor increases and the speed of the first motor is held constant.

3. The drive system of claim 1, wherein:

the transmission ratio is controlled by the control system so that the speed of the second motor is dependent upon an output torque demand on the output shaft.

4. The drive system of claim 1, wherein:

the first motor is a heat engine; and

the second motor is an electric motor.

5. The drive system of claim 4, wherein:

the heat engine is an internal combustion engine.

6. The drive system of claim 1, wherein:

the first motor is a turbine.

7. The drive system of claim 1, wherein:
the first motor is coupled to the sun gear;
the second motor is coupled to the ring gear; and
the output shaft is coupled to the carrier.

8. The drive system of claim 1, wherein:
the first motor is coupled to the sun gear;
the second motor is coupled to the carrier; and
the output shaft is coupled to the ring gear.

9. The drive system of claim 1, further comprising:
a synchronizer which couples rotation of the first motor and the output shaft at a fixed transmission ratio.

10. The drive system of claim 1, wherein:
the first motor is operated in a performance range by varying the speed of the second motor thereby varying the transmission ratio between the first motor and the output shaft to maintain operation in the performance range.

11. The drive system of claim 10, wherein:
the first motor is operated in the performance range with a speed in a range of less than 2000 rpm while the power output increases at least 50% of a peak power output.

12. The drive system of claim 11, wherein:
the first motor is operated with the speed in the performance range of less than 1000 rpm.

13. The drive system of claim 1, wherein:

the first and second motors both add power to the output shaft.

14. The drive system of claim 1, further comprising the step of:

means for stopping the second motor to provide a fixed speed ratio between the first motor and the output shaft.

15. The drive system of claim 14, wherein:

the first and second motors combine power in series to the output shaft.

16. The drive system of claim 1, further comprising:

a power storage device;

the second motor being an electric motor capable of operating as a generator, the second motor being coupled to the power storage device to generate and store electrical energy.

17. A method of varying the transmission ratio between the first motor and the output shaft using a second motor, comprising the steps of:

providing a first motor, a second motor, an output shaft and a planetary gear set including a ring gear, a sun gear and a carrier which supports at least one planet gear;

coupling the first motor, the second motor, and the output shaft each to one of the ring gear, sun gear and carrier;

producing a rotary output at the output shaft, wherein the transmission ratio between the first motor and the output shaft is varied by varying the speed of the second motor.

18. The method of claim 17, wherein:

the producing step is carried out with the speed of the output shaft increasing when the speed of the second motor increases when the speed of the first motor is held constant.

19. The method of claim 17, wherein:

the producing step is carried out with the transmission ratio being controlled by the second motor based upon an output torque demand on the engine.

20. The method of claim 17, wherein:

the providing step is carried out with the first motor being a heat engine and the second motor is an electric motor.

21. The method of claim 20, wherein:

the providing step is carried out with the heat engine being an internal combustion engine.

22. The method of claim 17, wherein:

the providing step is carried out with the first motor being coupled to the sun gear, the second motor being coupled to the ring gear, and the output shaft being coupled to the carrier.

23. The method of claim 17, wherein:

the providing step is carried out with the first motor being coupled to the sun gear, the second motor being coupled to the carrier and the output shaft being coupled to the ring gear.

24. The method of claim 17, further comprising:

the providing step is carried out with a synchronizer for synchronizing the rotation of the first motor and the output shaft.

25. The method of claim 24, further comprising the step of:

synchronizing the rotation of the first motor, second motor and output shaft using the synchronizer.

26. The method of claim 17, wherein:

the producing step is carried out in a manner which operates the first motor within a desired performance range by varying the transmission ratio between the first motor and the output shaft.

27. The method of claim 17, wherein:

the producing step is carried out by varying the rotating speed of the second motor so that the first motor operates at a speed within the desired performance range.

28. The method of claim 27, wherein:

the producing step is carried out with the desired performance range being a range of less than 2000 rpm for the first motor while the power output increases 50% of a peak power output.

29. The method of claim 27, wherein:

the producing step is carried out with the desired performance range being a range of less than 1000 rpm for the first motor while the power output increases 50% of a peak power output.

30. The method of claim 17, wherein:

the producing step is carried out by combining a power of the first motor with a power of the second motor when the output shaft is initially not rotating.

31. The method of claim 17, further comprising the step of:

stopping the second motor to provide a fixed speed ratio between the first motor and the output shaft.

32. The method of claim 17, further comprising:

synchronizing rotation of first motor and the output shaft, wherein a power of the first motor is combined serially with the power of the second motor to provide power to the output shaft.

33. The method of claim 17, further comprising the step of:

generating electrical energy with the second motor, the second motor being an electrical motor;

storing the electrical energy in a power storage device.

34. A method of combining power from a first motor and a second motor, comprising the steps of:

providing a drive system having an output shaft which produces a rotary output, the drive system including a planetary gear set having a ring gear, a sun gear and a carrier having at least one planet gear, the first motor being a heat engine and the second motor being an electric motor;

coupling the first motor to the sun gear, the second motor to the ring gear, and the output shaft to the carrier and

producing the rotary output at the output shaft by operating at least one of the first and second motors.

35. The method of claim 34, wherein:

the producing step is carried out with the second motor being used to vary the transmission ratio between the first motor and the output shaft by varying the speed of the second motor.

36. The method of claim 34, wherein:

the producing step is carried out with the second motor being used to continuously vary the transmission ratio of the first motor to the output shaft.

37. The method of claim 36, wherein:

the producing step is carried out while maintaining the rotating speed of the heat engine within a speed range.

38. The method of claim 34, wherein:

the producing step is carried out with the first and second motors combining power.

39. The method of claim 34, wherein:

the producing step is carried out with the first and second motors combining power in parallel.

40. The method of claim 34, wherein:

the producing step is carried out with the second motor controlling the transmission ratio of the first motor to the output shaft.

41. The method of claim 34, wherein:

the producing step is carried out with the speed of the second motor being selected to alter a transmission ratio between the first motor and the output shaft.

42. The method of claim 41, wherein:

the producing step is carried out with the speed of the second motor depending upon a torque demand.

43. The method of claim 34, wherein:

the producing step is carried out with the second motor controlling the transmission ratio to allow the rotating speed of the first motor to be maintained within a desired speed range.

44. The method of claim 34, wherein:

the producing step is carried out with an output torque on the output shaft being used to determine the transmission ratio between the first motor and the output shaft, wherein the transmission ratio is controlled with the second motor.

45. The method of claim 34, further comprising the step of:

generating electrical energy with the second motor; and

storing the electrical energy in a power storage device.

46. The method of claim 45, wherein:

the producing step is carried out with the second motor being prevented from rotating with a brake which locks the ring gear, wherein locking the ring gear produces a fixed transmission ratio between the first motor and the output shaft.

47. The method of claim 34, wherein:

the providing step is carried out with the first and second motors having continuous or intermittent power ratings within 20% of one another.

48. The method of claim 34, wherein:

the providing step is carried out with the first and second motors having continuous power ratings within 10% of one another.

49. The method of claim 34, wherein:

the producing step is carried out with the speed of the second motor and transmission ratio being selected by a control system dependent upon a load demand.

50. The method of claim 34, wherein:

the producing step is carried out with the speed of the output shaft increasing when the speed of the second motor increases while the speed of the first motor is held constant.

51. The method of claim 34, further comprising:

synchronizing rotation of first motor and the output shaft so that the first motor and output shaft have a fixed transmission ratio.

52. The method of claim 51, wherein:

the synchronizing step is carried out with the first and second motors combining power serially to the output shaft.

53. A method of combining the power of a first motor and a second motor, comprising the steps of:

providing an output shaft, a first motor, a second motor, and a planetary gear set having a ring gear, a sun gear and a carrier having at least one planet gear, the first motor, second motor and output shaft being coupled to at least one of the ring gear, sun gear and carrier; and

varying the transmission ratio between the first motor and the output shaft by varying the speed of the second motor, wherein the speed of the output shaft increases when the speed of the second motor is increased while the speed of the first motor is constant.

54. The method of claim 53, wherein:

the producing step is carried out with the transmission ratio being controlled by the second motor based upon an output torque demand.

55. The method of claim 53, wherein:

the providing step is carried out with the first motor being a heat engine and the second motor is an electric motor.

56. The method of claim 55, wherein:

the providing step is carried out with the heat engine being an internal combustion engine.

57. The method of claim 53, wherein:

the providing step is carried out with the first motor being coupled to the sun gear, the second motor being coupled to the ring gear, and the output shaft being coupled to the carrier.

58. The method of claim 53, wherein:

the providing step is carried out with the first motor being coupled to the sun gear, the second motor being coupled to the carrier and the output shaft being coupled to the ring gear.

59. The method of claim 53, further comprising:

the providing step is carried out with a synchronizer for synchronizing the rotation of the first motor and the output shaft.

60. The method of claim 59, further comprising the step of:

synchronizing the rotation of the first motor, second motor and output shaft using the synchronizer.

61. The method of claim 53, wherein:

the producing step is carried out in a manner which operates the first motor within a desired performance range by varying the transmission ratio between the first motor and the output shaft.

62. The method of claim 53, wherein:

the producing step is carried out by varying the rotating speed of the second motor so that the first motor operates at a speed within the desired performance range..

63. The method of claim 62, wherein:

the producing step is carried out with the desired performance range being a range of less than 2000 rpm for the first motor while the power output increases 50% of a peak power output.

64. The method of claim 62, wherein:

the producing step is carried out with the desired performance range being a range of less than 1000 rpm for the first motor while the power output increases 50% of a peak power output.

65. The method of claim 53, wherein:

the producing step is carried out by combining a power of the first motor with a power of the second motor when the output shaft is initially not rotating.

66. The method of claim 53, further comprising the step of:

stopping the second motor to provide a fixed speed ratio between the first motor and the output shaft.

67. A method of combining the power from a first motor and a second motor, comprising the steps of:

providing a first motor, a second motor and an output shaft for doing work, the first and second motors being coupled to the output shaft, the first and second motors both transmitting power to the output shaft, wherein a change in speed of the second motor changes a transmission ratio between the first motor and the output shaft;

operating the first motor in a desired performance range by varying the transmission ratio between the output shaft and the first motor by varying the speed of the second motor.

68. The method of claim 53, wherein:

the producing step is carried out with the transmission ratio being controlled by the second motor based upon an output torque demand on the engine.

69. The method of claim 53, wherein:

the providing step is carried out with the first motor being coupled to the sun gear, the second motor being coupled to the ring gear, and the output shaft being coupled to the carrier.

70. The method of claim 53, wherein:

the providing step is carried out with the first motor being coupled to the sun gear, the second motor being coupled to the carrier and the output shaft being coupled to the ring gear.

71. The method of claim 53, further comprising:

the providing step is carried out with a synchronizer for synchronizing the rotation of the first motor and the output shaft.

72. The method of claim 53, wherein:

the producing step is carried out with the desired performance range being a range of less than 2000 rpm for the first motor while the power output increases 50% of a peak power output.

73. The method of claim 53, further comprising the step of:

stopping the second motor to provide a fixed speed ratio between the first motor and the output shaft.

74. A method of adjusting the transmission ratio of a primary motor using a second motor, comprising the steps of:

providing a primary motor and secondary motor, the primary motor being coupled to an output shaft to provide power at the output shaft; and

varying the speed of the second motor to adjust the transmission ratio between the first motor and the output shaft, wherein as the second motor increases in speed the output shaft speed increases when the primary motor speed is held constant.

75. The method of claim 74, wherein:

the varying step is carried out with the secondary motor combining power with the primary motor.

76. The method of claim 74, wherein:

the providing step is carried out with a planetary gear set coupling the primary and secondary motors to the output shaft.

77. A method of varying a transmission ratio between a first motor and an output shaft using a second motor, comprising the steps of:

providing a drive system having an output shaft which produces a rotary output, the drive system including a first motor which is a heat motor and a second motor which is an electric motor; and

varying the transmission ratio between the first motor and the output shaft by changing the speed of the second motor, wherein the power of the first and second motors is combined and transmitted to the output shaft.

78. The method of claim 77, wherein:

the varying step is carried out with the speed of the output shaft increasing when the speed of the second motor increases.

79. The method of claim 77, wherein:

the providing step is carried out with the drive system including a planetary gear set having a ring gear, a sun gear and a carrier having at least one planet gear.

80. The method of claim 77, further comprising the step of:

coupling the first motor to the sun gear, the second motor to the ring gear, and the output shaft to the carrier.

81. The method of claim 80, further comprising the step of:

coupling the first motor to the sun gear, the second motor to the carrier, and the output shaft to the ring gear.

82. The method of claim 77, further comprising the step of:

stopping the second motor so that the second motor does not contribute power to the drive system.

83. The method of 82, wherein:

the stopping step results in a fixed speed ratio between the first motor and the output shaft.

84. The method of claim 77, further comprising the step of:

mechanically synchronizing the first motor with the output shaft to provide a fixed speed ratio between the first motor and the output shaft.

85. The method of claim 77, wherein:

the varying step is carried out with the speed of the second motor being selected based upon a required output torque on the output shaft.

86. A drive system for performing work, the drive system comprising:

a planetary gear set including a sun gear, a ring gear and a carrier having a least one planet gear;

a first motor coupled to at least of the sun gear, ring gear and carrier

a second motor coupled to at least one of the sun gear, ring gear and carrier ; and

an output shaft coupled to at least one of the sun gear, ring gear and carrier;

wherein the speed of the second motor is changed to change a transmission ratio between the first motor and the output shaft, the speed of the output shaft increasing when the speed of the second motor increases and the speed of the first motor is constant.

87. The drive system of claim 86, wherein:
the first motor is coupled to the sun gear;
the second motor is coupled to the ring gear; and
the output shaft is coupled to the carrier.

88. The drive system of claim 86, wherein:
the first motor is coupled to the sun gear;
the second motor is coupled to the carrier; and
the output shaft is coupled to the ring gear.

89. The drive system of claim 86, wherein:
the first and second motors combine power.

90. The drive system of claim 86, wherein:
the first motor is a heat engine; and
the second motor is an electric motor.

91. The drive system of claim 86, wherein:
a speed of the second motor is used to vary a transmission ratio between the first motor and the output shaft in response to a torque demand on the output shaft..

92. The drive system of claim 91, further comprising:
a control system which controls operation of the first and second motors, the control system varying the speed of the second motor to vary the transmission ratio in response to a torque on the output shaft.

93. The drive system of claim 86, wherein:
the control system varies the speed of the second motor to vary the transmission ratio to maintain the first motor in a desired operating range.

94. The drive system of claim 93, wherein:

the control system varies the speed of the second motor so that the first motor operates in a desired speed range.

95. The drive system of claim 94, wherein:

the control system varies the speed of the second motor so that the first motor operates within a range of 2000 rpm while the power increases at least 50% of a peak power output.